



# PARKScience

Integrating Research and Resource Management in the National Parks

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## Highlights

### **Airborne mercury issues detailed on updated NPS Web site**

Rising levels of mercury in the global atmosphere and increasing recognition of its effects on ecosystems has raised concerns for mercury impacts on National Park System lands. In aquatic ecosystems, mercury can be readily transformed into bio-available methylmercury, and accumulation of this contaminant in the environment can result in fish consumption advisories and increases of mercury toxicity in predatory animals such as common loons and alligators. Recent studies have also shown that mercury is accumulating in terrestrial ecosystems, with elevated levels of mercury documented in invertebrates, forest songbirds, and mammals across the United States (Schweiger et al. 2006; Evers 2005; Environmental Protection Agency 1997). Abnormally high levels of mercury ultimately lead to reduced reproductive success, impaired growth and development, behavioral abnormalities, reduced immune response, and decreased survival. In response to these concerns, the Air Resources Division of the National Park Service recently updated its airborne mercury Web site to include several new information products that are now available for use.

The Web site features an overview of mercury research in national parks, highlighting major projects and their findings. The wide range of mercury studies can assist park staffs in identifying information needs and management actions. For instance, one report for Acadia National Park (Maine) concludes that soils burned by forest fires contain higher methylmercury concentrations than if they had not burned (Amirbahman et al. 2004), a finding that may have implications for fire management. Another survey in Acadia found that mercury may be the cause of declines in the northern dusky salamander population (Bank et al. 2006). At Everglades National Park (Florida), mercury concentrations in frog leg tissue exceeded federal advisory limits (Ugarte et al. 2005), while wading birds contained liver mercury at concentrations associated with reproductive impairment in ducks and pheasants (Sundlof et al. 1994). Rumbold et al. (2002) noted that alligators in Everglades were more highly exposed to mercury in their environment than alligators elsewhere. Additionally, a research finding at Voyageurs National Park (Minnesota) suggests that stability in lake water levels affects methylating microbes (i.e., sulfate-reducing bacteria that add carbon, or the methyl group, to previously bio-unavailable forms of mercury), thus reservoirs can be managed to decrease the rate of this biological process (Sorenson et al. 2005).

Other products include a fact sheet titled "Airborne Mercury Issues," which gives a brief, topical overview that is useful in communicating mercury issues in parks, and links to other relevant Web

sites. Among the links are Web sites that detail mercury thresholds for selected wildlife and national, regional, state, and park-specific information on mercury effects on health and the environment. Many national parks, for example, are located where fish consumption advisories are statewide (i.e., not focused solely on specific water bodies). These include national park units in the Great Lakes region and northeastern United States.

*Control of local sources of mercury is an important strategy for its reduction in park ecosystems.*

Human activities have greatly increased the amount of mercury cycling in the atmosphere, soils, lakes, and streams through processes such as burning coal for electricity and incinerating municipal, hazardous, and medical waste. Although mercury is a growing global problem, recently published research suggests that much mercury deposits near its source, thus control of local sources of mercury is an important strategy for its reduction in park ecosystems (Keeler et al. 2006). Control technologies are now available to reduce mercury emissions from industrial sources. The National Park Service monitors mercury in wet deposition at several park units across the country through the National Atmospheric Deposition Program / Mercury Deposition Network, which includes 95 sites. Through analysis of mercury effects and information sources such as the airborne mercury issues Web site, the National Park Service facilitates the use of parks for scientific inquiry, supports science-informed decision making, and communicates the relevance of and provides access to research knowledge.

The updated Web site is at [http://www2.nature.nps.gov/air/Studies/air\\_toxics/mercury.cfm](http://www2.nature.nps.gov/air/Studies/air_toxics/mercury.cfm).

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